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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,320	07/24/2003	Yoshitaka Masutani	16NM02038	1342

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EXAMINER

JASANI, ASHISH S

ART UNIT	PAPER NUMBER
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3737

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/626,320	Applicant(s) MASUTANI ET AL.	
	Examiner Ashish S. Jasani	Art Unit 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/10/06 have been fully considered but they are not persuasive.

With respect to Applicants' argument regarding the rejection claim 1, At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to randomly move grid points because Applicant has not disclosed that random grid movement provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with the Mori et al. pixel connection method using adjacent pixels (column 15, line 61) because, as shown in Figure 6, all the pixels will be treated as if a random method was used. In regards to the Applicants argument that a "device that propagates the data point based upon the anisotropy index does not teach of" start point tracking has no bearing on the random movement of the grid. The anisotropy index refers to the diffusion tensor analysis.

With respect to Applicants' argument regarding the rejection claim 2, in order for the Mori et al. to perform the diffusion tensor analysis on adjacent pixels "along more than six axes" (abstract), Mori et al. teaches of a diffusion sensor which has an eigen value and vector (abstract). This means that the diffusion sensor is a matrix operator on a grid of points as shown in Equation 1.

In regards to the Applicants disclosure of Ex parte Levengood, the previously disclosed rejection is not based on different individual elements of the pending claims.

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Mori et al. teaches of a coloring scheme (column 5, lines 54-57) and elsewhere. Laidlaw et al. teaches of a coloring scheme, which employs displaying opacity.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(g)(1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

2. Claim 1, 5, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Mori (USPN 6526305).

With regards to claims 1 and 5, Mori teaches in the abstract of "A method of creating an image of brain fibers includes exposing the brain fibers to a magnetic resonance imaging process. The data acquisition from the magnetic resonance imaging includes the acquisition of diffusion-weighted, images that are later employed to calculate an apparent diffusion constant at each pixel along more than six axes. The

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data is introduced into a microprocessor which calculates six variable in a diffusion tensor and obtains a plurality of eigen values and eigen vectors. This may be accomplished by employing a diffusion sensor which is diagonalized to obtain three eigen values and three eigen vectors with the six values being subjected to further microprocessing to generate imaging information representing the properties of the fibers" (abstract).

Mori teaches of "The fiber tracking, on the other hand, is performed in a continuous number field by referencing nearby three-dimensional discrete data grids" (column 4, lines 49-52 & Figure 6).

Mori teaches of the start point and endpoint tracking neighborhood point analysis when describing "the process in a preferred embodiment includes the initiation of fiber tracking by selecting a pixel for initiation of the same, connecting of pixels and effecting a judgment regarding termination of the pixel tracking in each direction based upon the randomness of the fiber orientation of the adjacent pixels" (abstract).

Displaying of the images can be seen in figures 4-5 and 7.

With regards to claim 6, Mori teaches "the endpoint may be defined when the extent of anisotropy is weaker than a threshold value. The extent of the anisotropy can be quantified in various ways using three eigen values, λ_1 , λ_2 , and λ_3 , such as by calculating the ratio between λ_1 and λ_3 " (column 5, lines 33-37). The thresholding of the "extent of anisotropy" is used to track strongly aligned fibers (column 5, lines 12-13). Mori goes on to teach that the prominent fiber bundles are color coded (column 5, lines 26-29).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (USPN 6526305) in further view of Laidlaw et al. (US PG PUB 2003/0234781).

Mori teaches of all of the limitations of claim 2 via claim 1 except for displaying the image with opacity values that reflect the diffusion anisotropy values.

Laidlaw et al. teaches of a fiber rendering apparatus in which "the primary data can be diffusion tensor data generated by the MRI system from tissue, and the data processor operates to identify directed diffusion paths and to render the directed diffusion paths as thread-like structures" (abstract). Laidlaw et al. goes on to cite Mori as prior art in paragraph 9. Laidlaw et al. discriminates the ellipsoid approach as taught by Mori (column 3, lines 9-39) by saying that by "placing an ellipsoid at every data point in three dimensional space obscures all layers of ellipsoids except the outermost layer" (§ 13). Laidlaw et al. goes to cite Kindlmann et al. in paragraph 14 by saying their group was able to overcome the problem of obscuring data points by assigning every data point a certain opacity and color based on the underlying diffusion tensor dataset.

Laidlaw et al. describes a need to improve existing methods of fiber rendering, such as Mori. Therefore it would have been obvious to a person of ordinary skill in the

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art at the time of the invention was made to combine the Mori fiber tracking method and apparatus with the Laidlaw et al. opacity dependent display in order to overcome the problem of obscuring data points within the tracked fiber. This allows more data to be visualized by the user.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashish S. Jasani whose telephone number is 571-272-8025. The examiner can normally be reached on Mon. - Fri. 9:30 am - 3:30 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on (571) 272 - 4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ASJ


BRIAN L. CASLER
SUPERVISOR OF THE EXAMINERS